

1 LISTING OF THE CLAIMS

2 We claim:

3 1. (Currently amended) A method comprising generating a Concrete Model, said Concrete  
4 Model for describing a structure of resources implementable over a computing utility  
5 infrastructure; created using infrastructure elements, and satisfying a set of service requirements,  
6 said Concrete Model being generated from a Service Environment Model and an Infrastructure  
7 Model, said Service Environment Model being a description of characteristics of a desired  
8 service and being independent of the infrastructure, said Infrastructure Model encapsulating  
9 knowledge on elements of the infrastructure, including resource instances, resource types,  
10 resource configuration, resource capabilities and constraints, said step of generating comprising  
11 the steps of:

12 obtaining ~~a~~ the Service Environment Model of a service environment, said Service  
13 Environment Model describing a set of requirements on an initial ~~a~~ new desired state of  
14 said service environment;

15 getting ~~an~~ the Infrastructure Model describing both resources and an organization of the  
16 resources in the computing utility infrastructure, said Infrastructure Model ~~is~~ being  
17 encapsulated in a knowledge subsystem; and

18 forming the Concrete Model from the Service Environment Model and the Infrastructure  
19 Model, said Concrete Model describing a resource structure ~~such that said Concrete~~  
20 ~~Model refines~~ refining the Service Environment Model and ~~is~~ being mappable to said  
21 knowledge subsystem so that an implementation of the Concrete Model satisfies  
22 requirements and characteristics described in the Service Environment Model.

2. (Currently amended) A method as recited in claim 1, wherein the step of obtaining the Service Environment Model of the service environment includes receiving a description of a set of requirements on ~~a~~ another new desired state of said service environment.

3. (Currently Amended) A method as recited in claim 1, wherein said Service Environment Model step of describing being ~~is~~ independent of the computing utility infrastructure, and said Concrete Model providing provisioning and managing of computing services in a computing utility system, based on a high level description of the characteristics and structure of desired computing services and a representation of the computing utility infrastructure used as a platform to implement the said computing services;

4. (Original) A method as recited in claim 1, wherein said service environment is an entity taken from a group of entities consisting of: a Web site, an on-line gaming service, a scientific computation service, an e-business service, a computing service, and any combination of these.

5. (Previously presented) A method as recited in claim 1, implemented as an article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing generation of the Concrete Model, the computer readable program code means in said article of manufacture comprising code for causing a computer to effect the steps of claim 1.

6. (Previously presented) A method as recited in claim 1, wherein the step of getting an Infrastructure Model includes an action taken from a group of actions consisting of: querying at least one knowledge subsystem entity; querying Resource Managers; querying Resource Instance Services; querying a best practices catalog; obtaining knowledge of available resource types; obtaining knowledge of resources constraints; obtaining knowledge of resource capabilities; obtaining knowledge of infrastructure constraints; obtaining knowledge of infrastructure capabilities; obtaining knowledge of infrastructure best practices patterns; and any combination of these actions.

1 7. (Previously presented) A method as recited in claim 1, wherein the step of forming a Concrete  
2 Model includes:

3 at least one refinement step comprised of selecting a node and replacing said node with a  
4 sub graph structure to obtain an intermediary model which is an input to a next refinement step;  
5 and

6 repeating the step of selecting and replacing until a resulting intermediary model is  
7 mappable to said knowledge subsystem.

8 8. (Previously presented) A method as recited in claim 7, wherein said step of replacing  
9 comprises a limitation taken from a group of limitations consisting of: querying a best practices  
10 catalog; generating sub graph patterns dynamically; employing graph matching techniques to  
11 obtain said sub-graph structure; employing graph merging techniques to obtain said sub-graph  
12 structure; or any combination of these limitations.

13 9. (Previously presented) A method as recited in claim 1, implemented as a program storage  
14 device readable by computer , tangibly embodying a program of instructions executable by the  
15 computer to perform method steps for generating the Concrete Model, said method steps  
16 comprising the steps of claim 1.

17 10. (Original) A method as recited in claim 1, further comprising using said generating said  
18 Concrete Model to enforce a policy based service provider's best practices in implementation of  
19 Service Environments in the computing utility infrastructure.

20 11. (Original) A method as recited in claim 10, wherein the best practices are encoded as  
21 patterns in a best practices catalog and used in the step of forming said Concrete Model.

22 12. (Previously presented) A method as recited in claim 1, further comprising employing said  
23 Concrete Model to generate provisioning actions,

1 said provisioning actions, when executed, creating a resource structure that matches the  
2 description in the Concrete Model; and

3 said resource structure satisfying said set of requirements on the new desired state of said service  
4 environment.

5 13. (Original) A method as recited in claim 12, further comprising employing said provisioning  
6 to enforce a policy based service provider's best practices in implementation of service  
7 environments in the computing utility infrastructure.

8 14. (Original) A method as recited in claim 13, wherein the best practices are encoded as  
9 patterns in a best practices catalog and used in the step of forming the Concrete Model.

10 15. (Original) A method as recited in claim 12, wherein step of provisioning includes a task  
11 taken from a group of tasks consisting of: creating a new service environment, changing the  
12 combination of resources allocated to a service environment, changing the configuration of  
13 resources allocated to a service environment, or destroying a service environment, or any  
14 combination of the above.

15 16. (Original) A method as recited in claim 15, wherein changing the configuration of resources  
16 allocated to a service environment include changing the local state of a resource or changing the  
17 way the resource is configured to work with other resources.

18 17. (Previously presented) A method as recited in claim 1, wherein the method is used to  
19 regenerate provisioning instructions whenever at least one of the following occurs: infrastructure  
20 characteristics change; or requirements of a service change.

21 18. (Previously presented) A method as recited in claim 17, wherein the infrastructure  
22 characteristics include a characteristic taken from a group of characteristics consisting of: types  
23 of resources in the infrastructure; capabilities of said resources; configuration of said resources;

constraints on configuration of said resources; best practices patterns as defined in the best practices catalog; or any combination of the above.

19. (Currently amended) A method as recited in claim 1, further comprising employing said Concrete Model to generate a Resource Manager for a composite resource, and provisioning and managing computing services in a computing utility system, based on a high level description of the characteristics and structure of desired computing services and a representation of the computing utility infrastructure used as a platform to implement the said computing services.

20. (Previously presented) A method as recited in claim 19, wherein said Resource Manager provides a set of resource manager methods taken from a group of resource manager methods consisting of: creating composite resources based on a Concrete Model; changing composite resources based on a Concrete Model; destroying composite resources based on a Concrete Model; or any combination of these methods.

21. (Previously presented) An apparatus comprising means for generating a Concrete Model, said Concrete Model describing a structure of resources implementable over a computing utility infrastructure, and satisfying a set of service requirements, said means for generating comprising the steps of:

means for obtaining a Service Environment Model of a service environment, said Service Environment Model describing a new desired state of said service environment;

means for getting an Infrastructure Model describing both resources and an organization of the resources in the computing utility infrastructure, said Infrastructure Model is encapsulated in a knowledge subsystem and

means for forming the Concrete Model describing a resource structure such that said Concrete Model refines the Service Environment Model and is mappable to said knowledge subsystem .

1 22. (Original) An apparatus as recited in claim 21, further comprising means for employing said  
2 Concrete Model to generate provisioning actions, said provisioning actions, when executed,  
3 create a resource structure that matches the description in the Concrete Model, said resource  
4 structure satisfies said new desired state of said service environment.

5 23. (Previously presented) An apparatus as recited in claim 21, implemented as a computer  
6 program product comprising a computer usable medium having computer readable program code  
7 means embodied therein for causing generation the Concrete Model, the computer readable  
8 program code means in said computer program product comprising code for causing a computer  
9 to effect the functions of claim 21.

10 24. (Original) An apparatus as recited in claim 21, further comprising means for employing said  
11 Concrete Model to generate a Resource Manager for a composite resource.

12 25. (Previously presented) A method as recited in claim 1, where the step of generating a  
13 Concrete Model is performed by a user taken from a group of users consisting of: a service  
14 provider; a customer of a service provider; a company owning an IT infrastructure; and a utility  
15 provider.